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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,488	06/29/2001	Tomoaki Kato	Q63852	6301

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EXAMINER

LEURIG, SHARLENE L

ART UNIT	PAPER NUMBER
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2879

DATE MAILED: 06/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/893,488

Applicant(s)

KATO ET AL.

Examiner

Sharlene Leurig

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 and 20-26 is/are pending in the application.
- 4a) Of the above claim(s) 23-26 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 and 20-22 is/are rejected.
- 7) ☒ Claim(s) 2 and 10 is/are objected to.
- 8) ☒ Claim(s) 1-15 and 20-26 are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Response to Amendment

The amendment filed on February 3, 2003 has been entered and acknowledged by the Examiner. The amendments to claims 1 and 8 have been entered, claims 20-26 have been added, and claims 16-19 have been cancelled.

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-15 and 20-22, drawn to a spark plug, classified in class 313, subclass 143.
 - II. Claims 23-26, drawn to a method of producing a spark plug, classified in class 445, subclass 7.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process

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(MPEP § 806.05(f)). In the instant case the spark plug can be made by a heat treatment carried out in a nitrogen or an inert gas atmosphere.

3. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

4. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

5. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

6. Newly submitted claims 23-26 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the claims are directed to a process of making a spark plug, as discussed above.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 23-26 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Objections

7. Claims 2 and 10 are objected to because of the following informalities: the language of the claims is confusing because of what appears to be a missing conjunction. The Examiner advises the applicant to amend the claim to read along the lines of: “. . . whose principal component is the one of the platinum and the iridium and is an alloy containing a sub-component of a nickel.” Appropriate correction is required.

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1-4, 7 and 20 stand rejected under 35 U.S.C. 102(b) as being anticipated by Mamoru et al. (JP 06-338376) (of record).

Regarding claim 1, Mamoru discloses a spark plug with a center electrode (Figure 1, element 3) and a ground electrode (Figure 1, element 4) “which forms the spark discharge gap G” between it and the center electrode (paragraph 0009, line 6). The igniter (Figure 1, element 12), fixed to the ground electrode in the example illustrated by Figure 1, faces the spark discharge gap, G. Mamoru discloses that the “precious alloy electrode” may be formed in the igniter on the ground electrode or the center electrode (paragraph 0032, line 5). The gas concentration of nitrogen and oxygen of the Pt-nickel alloy composing the igniter is 100 ppm or less (paragraph 0029,

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line 5). In one embodiment the igniter is fused with the material composing the ground electrode and also composed of a platinum alloy (paragraph 0014). The materials that compose the ground electrode are not necessarily the same alloys as those composing the center electrode (paragraphs 0011 and 0013), and therefore the igniter is free from a material of the center electrode.

Regarding claims 2 and 3, the principal component of the igniter consists of at least one of the following metallic materials: platinum or a platinum alloy such as a “Pt-nickel alloy” or an “Ir-nickel alloy” or a “Pt-Ir-nickel alloy” (paragraph 0014, line 3).

Regarding claim 4, the Pt-nickel alloy consists of 20% of the weight in nickel, fitting into the claimed range of 2% to 40% of total mass (paragraph 0017, line 2).

Regarding claim 7, Mamoru further discloses the spark plug to be designed in such a way to “prevent the injury on an internal combustion engine,” which is intrinsically a gas engine, in which it is mounted (paragraph 0005, line 4).

Regarding claim 20, Mamoru discloses an igniter fixed to the ground electrode via a weldment, since the igniter is joined to the electrode by laser welding (Abstract Constitution, line 7).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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11. Claims 5-6 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Abe et al. (6,215,234) (of record). Mamoru discloses a spark plug with all the limitations discussed above but lacks a spark discharge gap defined by the range of 0.2 mm to 0.6 mm.

It is well known in the art to lower the required voltage of a spark plug.

Abe teaches a spark discharge gap within a range of 0.2 mm to 0.4 mm (column 2, line 5), which fits within the claimed range of 0.2 mm to 0.6 mm and is therefore not more than 0.6 mm. Abe teaches this spark gap range in order to lower the required voltage for producing sparks (column 2, lines 15-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a spark discharge gap fitting with a range of 0.2 mm to 0.4 mm in order to lower the required voltage to produce sparks, as taught by Abe.

12. Claims 8-12, 15 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Chang et al. (6,045,424).

Mamoru discloses a spark plug with all the limitations discussed above but lacks a crystal grain mean diameter of more than 50 micrometers.

However, Mamoru recognizes the need for a long spark plug life (paragraph 0024, line 5) and the suppression of crack formation in the noble metal material (paragraph 0026, line 5).

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Regarding claim 8 and 21, Chang teaches a spark plug with an igniter tip made of a noble metal with a mean crystal grain diameter of 250 microns (column 5, lines 36-37). The formation of a tip with grains of this mean diameter helps prevent corrosion and cracking (column 5, lines 29-31).

Regarding claim 9, the mean diameter of the crystal grain is defined as a mean value of a maximum interval between a pair of parallel lines which are tangent to an outline of the crystal grain. Though Chang does not explicitly disclose how the mean diameter is measured, the Examiner takes Official Notice that the diameter of an irregular object is found by measuring the line drawn between two parallel lines at the extremes of the object. The “mean diameter” is inherently the average of all the data points collected.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru’s spark plug with a tip having an average crystal grain diameter of more than 50 microns in order to provide a spark plug with a more robust tip, as taught by Chang.

Regarding claim 10, Mamoru discloses an igniter made of a material that is a platinum-iridium alloy with a sub-component of nickel (paragraph 0014).

Regarding claim 11, Mamoru discloses a metallic material composing the igniter is made from a platinum-iridium alloy (paragraph 0014). Chang also teaches a metallic material composing the igniter is made from a platinum-iridium alloy (column 5, line 37).

Regarding claim 12, Mamoru discloses a Pt-nickel alloy consisting of 20% of the weight in nickel (paragraph 0017), which falls into the claimed range of 2 to 40%. Chang

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also teaches a platinum-iridium alloy where iridium is 20% of the alloy, which falls into the claimed range of 2 to 98% (column 5, line 37).

Regarding claim 15, Mamoru discloses the spark plug to be designed in such a way to “prevent the injury on an internal combustion engine,” which is intrinsically a gas engine, in which it is mounted (paragraph 0005, line 4).

Regarding claim 22, Mamoru discloses an igniter fixed to the ground electrode via a weldment, since the igniter is joined to the electrode by laser welding (Abstract Constitution, line 7).

13. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mamoru et al. (JP 06-338376) (of record) in view of Chang et al. (6,045,424) as applied to claims 8-9, 11-12 and 15 above, and further in view of Abe et al. (6,215,234) (of record).

Mamoru discloses a spark plug with all the limitations discussed above but lacks a crystal grain mean diameter of more than 50 micrometers. Chang teaches a crystal grain diameter of more than 50 microns. Both Mamoru and Chang lack a spark discharge gap defined by the range of 0.2 mm to 0.6 mm.

It is well known in the art to lower the required voltage of a spark plug.

Abe teaches a spark discharge gap within a range of 0.2 mm to 0.4 mm (column 2, line 5), which fits within the claimed range of 0.2 mm to 0.6 mm and is therefore not more than 0.6 mm. Abe teaches this spark gap range in order to lower the required voltage for producing sparks (column 2, lines 15-17).

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Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Mamoru's spark plug with a crystal grain diameter of more than 50 microns in order to produce a more hardy igniter, and to further modify it with a spark discharge gap fitting with a range of 0.2 mm to 0.4 mm in order to lower the required voltage to produce sparks, as taught by Abe.

Response to Arguments

14. Applicant's arguments filed on February 3, 2003 have been fully considered but they are not persuasive. The applicant has argued that claim 1 of the claimed invention are allowable over the prior art of record, namely "JP '376", because the igniter of the prior art "consists of a fused solid noble metal alloy layer 19 and top electrode 13 made of a Pt-Ir-Ni alloy" (page 9, lines 13-14) while the claim language recites an igniter "free from a material of the at least one of the center electrode and the ground electrode". JP '376 discloses an igniter material comprising a noble metal alloy that is fused with the material comprising the ground electrode. However, the igniter is free from the material of the center electrode, because although both the center electrode and the ground electrode contain nickel alloys (paragraphs 0011 and 0013), they are not necessarily the same alloys. Therefore in that embodiment the igniter is not necessarily fused with material that is the same as the material composing the center electrode. Therefore the rejection of claim 1 and all its dependent claims is maintained.

15. Applicant's arguments with respect to claims 8-15 have been considered but are moot in view of the new ground(s) of rejection.

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The applicant has argued that claim 8 and its dependents are allowable over the prior art, namely JP '376 in view of Abe '234 because Abe teaches away from a crystal grain size of more than 50 microns, while the amended claim 8 includes the limitation of a crystal grain size of more than 50 microns. In order to meet each and every limitation of claim 8, the rejection over JP '376 in view of Abe '234 has been withdrawn in favor of a rejection over JP '376 in view of Chang '424.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sharlene Leurig whose telephone number is (703)305-

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4745. The examiner can normally be reached on Monday through Friday, 8:30am-5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh Patel can be reached on (703)305-4794. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7382 for regular communications and (703)308-7382 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Sharlene Leurig
May 21, 2003

SL

Nimesh Patel
VIP PATEL
PRIMARY EXAMINER